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Notes:

1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

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FULL CONTENTS

[Claim(s)]

[Claim 1] In the brazing solder alloy of cadmium non-**, to 45 to Ag75 mass %, ten to Cu30 mass %, and Ga20 mass % The brazing solder alloy of cadmium non-** characterized by containing other alloy elements to 5 mass % in total by 0.1 to Mn8 mass % or Si, and/or 0.1 to germanium3 mass %, and a case to one to Zn25 mass %, Sn, and/or In6 mass %.

[Claim 2] The brazing solder alloy according to claim 1 which contains Co or nickel to 5 mass % in other alloy elements.

[Claim 3] The following presentations: Ag 50 to 70 mass %, Cu Ten to 20 mass %, Ga One to 20 mass %, Zn Five to 20 mass %, Sn, and/or In Zero to 6 mass %, Mn 0.1 to 8 mass % or Si, and/or germanium Brazing solder alloy according to claim 1 or 2 characterized by 0.1 - 3 mass %.

[Claim 4] The following presentations: Ag 50 to 60 mass %, Cu Ten to 20 mass %, Ga One to 20 mass %, Zn Ten to 20 mass %, Sn, and/or In One to 6 mass %, Mn Brazing solder alloy given [from Claim 1 to 3] in any 1 term characterized by 0.1 - 8 mass %.

[Claim 5] The following presentations: Ag 60 to 70 mass %, Cu Ten to 20 mass %, Ga Ten to 20 mass %, Zn Five to 10 mass %, Mn 0.1 to 8 mass % or Si, and/or germanium Brazing solder alloy given [from Claim 1 to 3] in any 1 term characterized by 0.1 - 3 mass %.

[Claim 6] The activity of a brazing solder alloy with high silver content given [from Claim 1 for soldering of a hard metal to 5] in any 1 term.

[Claim 7] The activity according to claim 6 for soldering of a hard metal segment which gave the diamond for manufacturing a boring head, or carried out the diamond coat.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the brazing solder alloy of a low-melt point point by cadmium non-** which has good wetting power on a hard metal.

[0002]

[Description of the Prior Art] Especially soldering is an economical conjugation method which protects an ingredient, and has high technical importance also in a mass production method also in the case of junction of each components. The big advantage of soldering is that an ingredient is mutually joinable at a comparatively low temperature with pewter. A soldering defect decreases in the effect of junction on energy expenditure and a base material, and general, so that soldering temperature is low. Therefore, especially the brazing solder of a low-melt point point has much need.

[0003] Pewter of a usual silver base contains other elements by Cu, Zn, Sn and In, and a case as a main alloy element in addition to Ag. Cadmium inclusion silver solder is a low-melt point point, and it is easy to solder, and it is various, and can apply it. however, cadmium -- and especially the steam has carcinogenicity. Therefore, the aforementioned pewter is [that the activity is only allowed and], protecting strict safety precaution. The advantage of pewter of cadmium inclusion is an especially low soldering temperature in which especially the low fusing point range ***** is possible. This was not attained from pewter of Ag base of usual cadmium non-** till these days.

[0004] However, the brazing solder of Ag which attains a soldering temperature having no addition of cadmium and lower than 630 degrees C over the past several years is well-known. this is attained when the aforementioned wax alloy contains Element Ga substantially by the ratio adjusted to versatility to other alloy elements.

[0005] Such an alloy is indicated to the patent specification DE No. 4315190, DE No. 4315189, DE No. 4315190, and DE No. 4323227. Especially the aforementioned alloy is devised as a substitute for the pewter of cadmium inclusion fused at low temperature.

[0006] In order to maintain as small as possible the cooling stress which is started thermally [since the coefficients of thermal expansion of a hard metal and a support material differ] especially in soldering of a hard metal, it asks for a low soldering temperature. That is, in addition to the difference of an expansion coefficient, the temperature gradient between the curing temperature of pewter and a room temperature is decisive for the magnitude of the stress induced. The hard metal [in / especially / tool industry] which offers high frictional resistance especially for the activity in a boring head and which carried out the diamond coat is used. Since it does not damage a diamond layer when to solder in the air the aforementioned hard metal which carried out the diamond coat on a support material under the activity of flux is needed from the Reason for technical, the soldering temperature must not exceed about 690 degrees C. Process safety and the safety of the quality of a product are so high in this case that soldering temperature is low.

[0007] However, since pewter in particular of well-known gallium inclusion does not wet the hard metal with which a hard metal and it are also used as a boring head good from the aforementioned literature, a soldering process becomes difficult by this.

[0008]

[Problem(s) to be Solved by the Invention] Therefore, the technical problem of this invention is offering the brazing solder which has the wettability of a toxic component, for example, a hard metal further very good [not containing cadmium in particular but], and has a soldering temperature lower than 650 degrees C. This especially pewter should be still more suitable because of soldering of a hard metal which carried out the diamond coat.

[0009]

[Means for Solving the Problem] By this invention, said technical problem to 45 to Ag75 mass %, ten to Cu30 mass %, and Ga20 mass % It is solved with the brazing solder alloy of cadmium non-** characterized by containing other alloy elements to 5 mass % in total by 0.1 to Mn8 mass % and/or Si, or 0.1 to germanium3 mass %, and a case to one to Zn25 mass %, Sn, and/or In6 mass %.

[0010] The brazing solder alloy of cadmium non-** by this invention may contain Co or nickel to 5 mass % advantageously in other alloy elements.

[0011] The following presentations: Ag 50 to 70 mass %, Cu Ten to 20 mass %, Ga One to 20 mass %, Zn Five to 20 mass %, Sn, and/or In Zero to 6 mass %, Mn 0.1 to 8 mass % or Si, and/or germanium It became clear that the alloy of 0.1 - 3 mass % was very good.

[0012] The following presentations: Ag 50 to 60 mass %, Cu Ten to 20 mass %, Ga One to 10 mass %, Zn Ten to 20 mass %, Sn, and/or In One to 6 mass %, Mn 0.1 to 8 mass %, and Ag 60 to 70 mass %, Cu Ten to 20 mass %, Ga Ten to 20 mass %, Zn Five to 10 mass %, Mn 0.1 to 8 mass % or Si, and/or germanium Especially the alloy of 0.1 - 3 mass % is advantageous.

[0013] The brazing solder alloy of cadmium non-** by this invention can be used especially advantageous because of hard soldering of a hard metal. The brazing solder by this invention has working temperature clearly lower than usual brazing solder.

[0014] Especially working temperature is the working temperature of brazing solder with cadmium inclusion of a low-melt point point, as a result a problem, and the working temperature of the brazing solder of the gallium inclusion by cadmium non-**, or is mainly a temperature lower than this.

[0015] In the 1st table furthermore indicated below, the comparisons with some alloys of the alloy (No.1-7) by this invention and the presentation (a presentation is mass %) of the brazing solder (No.8 and 9) of the gallium inclusion by well-known cadmium non-** and such working temperature are indicated.

[0016] Casting is possible very good, and pewter according to this invention based on comparatively few rates of Mn as an alloy content can change, as a result processing and treatment are satisfactorily possible for it in a manufacture process.

[0017] Especially the unexpected and unexpected characteristics of the brazing solder by this invention are the advantageous humid behavior on a hard metal.

[0018]

[Example] To an assessment of the wetting power of pewter on a hard metal sake The circular pewter plate of regular thickness (0.2mm) and magnitude (5mm in diameter) pierced from various wax alloys was placed on the hard metal test specimen, and flux was applied, and this test specimen was made

into soldering temperature with the heating rate general to application among oven in the air. The surface of the hard metal soaked in pewter is measured after cooling, and it is made to be proportional to the start surface area of a pewter plate. the result -- the 1st table -- "-- it gets wet and writes in the column of index." It became clear at that time that pewter by this invention had good wettability more remarkable than the brazing solder of gallium inclusion by well-known cadmium non-
** on a hard metal to the unexpected thing.

[0019] The advantage relevant to another practice of the brazing solder by this invention is improvement in the shearing strength of the brazing-and-soldering part manufactured using this brazing solder.

[0020] Especially the brazing solder alloy of cadmium non-
** according to this invention based on the aforementioned characteristics profile is remarkably suitable in the case of soldering of a hard metal segment which gave the diamond for soldering of a hard metal (for example, when especially a boring head is manufactured), or carried out the diamond coat.

[0021]

[Table 1]

第1表

No.	Ag	Cu	Ga	Zn	Sn/In	Mn/ Si/Ge	作業温度 °C	濡れ指数 (1)
1	56	18.5	3	17	5 (Sn)	0.5 (Mn)	620	3
2	56	16	3	17	3 Sn 2 In	3 (Mn)	610	5
3	56	14	3	17	5 (Sn)	5 (Mn)	635	7
4	62	15	15	7	-	1 (Si)	600	4
5	62	13	15	7	-	1 Si 2 Ge	580	5
6	62	11	15	7	-	5 (Mn)	615	6
7	54	20	3	17	5 (Sn)	1 (Ge)	610	3.5
8	55	20	3	17	5 (Sn)	-	630	1.5
9	63	15	15	7	-	-	600	2

(1) 濡れ指数 = 出発表面積 / ろう付けされた面積の比

[Translation done.]